

METEOROLOGY OF THE INDIAN OCEAN.¹

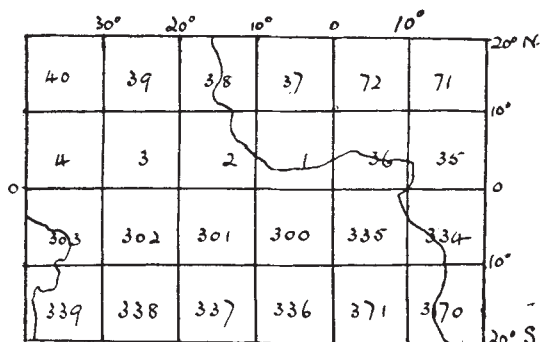
THE present volumes form a noteworthy contribution to the systematic knowledge of the meteorology of the sea on the lines laid down by the International Congress held in London in 1874. According to that plan the surface of the earth is divided by parallels of latitude and meridians, each 10° from the next, into sections numbered consecutively, starting from the square $0-10^\circ$ N. and $0-10^\circ$ W. of Greenwich, and proceeding west as indicated in the accompanying figure.

The observations from the meteorological log-books are then sorted according to the squares in which they are taken, and after a sufficient number has been obtained a definite scientific record of the meteorology of the region is made possible. If we look at it from another point of view, we might say that a knowledge of the "climate" of the different parts of the ocean may be obtained by this method.

The publications give the result of fifty years' observations, and some idea of the magnitude of the labour involved in reducing them to a form in which they are available for the sailor and the meteorologist may be gained from the fact that for each month about half a million observations had to be treated.

The tables give the values of the various elements for a large number of single degree squares in the following groups of 10° squares:—Nos. 63-69, 24-32, 323-332, 359-368, 396-406, 430-442, 466-478. These squares cover the whole of the Indian Ocean from Africa to Australia down to 50° S. lat.

The charts are not merely diagrammatic representations of the information contained in the tables. The guiding



principle in their construction has been to exhibit such information as a sailor will find useful, without overloading the map with unnecessary details or results of doubtful utility. On this account, also, the charts of cloud distribution, of rain and of fog, have been omitted from the present issue. The charts show the ocean current, the wind, the general circulation of sea and air, the mean pressure distribution, and the isotherms for the surface of the sea and for the atmosphere for each of the months September, October, and November. There are, in addition, three charts giving for each month the best routes for steam and sailing ships, at the same time showing the trajectories of cyclones and the northern limits of fog and floating ice.

An interesting result immediately seen on comparison of the wind and current charts is the fact that in regions where the wind is fairly steady in direction the ocean current flows to the left of the direction of the prevailing wind. Thus in the region of the trade winds, which blow from the south-east during these months, the ocean current flows steadily due west at an angle of 45° with the wind, while further south, where the prevailing wind is W. to W.N.W., the prevailing current comes from W. to W.S.W., although the regularity of the deviation is not so marked. This may be compared with Nansen's observations during the drifting of the *Fram* in northern latitudes.

¹ Koninklijk Nederlandsch Meteorologisch Instituut, No. 104. Oceanographische en Meteorologische Waarnemingen in den Indischen Oceaan, September, October, November, 1856-1904. Tabellen en Kaarten. (Utrecht: Kemink & Zoon, 1908.) Prijs (met atlas) 5.50 fl.

He found the direction of drift deviated $20^\circ-40^\circ$ to the right of the wind direction. The theory has been developed by Ekman (*Arkiv för Matematik*, vol. ii., No. 11), who found that in the open ocean, while the depth of the wind-produced current varied with the latitude, the deviation, an effect of the earth's rotation, was independent of the latitude and equal to 45° , except in the immediate neighbourhood of the equator. The current caused by the trade winds, on reaching the African coast, is deflected towards the south, and produces a marked effect on the temperature of the sea off the coast of Natal, where it is fully 5° C. warmer than in the same latitude in the open ocean or on the Australian coast.

A point especially worthy of commendation is the insertion in the tables of the number of observations on which each result is based. In the charts, too, the number of observations utilised for each 5° square is given. It is thus easy to see at a glance if an apparently anomalous result is doubtful owing to insufficiency of observations or really represents a feature worthy of investigation. In the pressure charts not only are the mean isobars drawn, but the mean pressure for each 2° square is inserted, one of the principal reasons for this being that small departures from the normal value in the barometric height are frequently in tropical regions a valuable indication of approaching cyclonic disturbances.

An important feature in the tables is the representation of the stability of the ocean currents and the wind. The value of this is taken to be the ratio of the resultant velocity to the mean velocity taken without regard to direction. It furnishes the sailor with an estimate of the probability of his meeting with the current or wind indicated by the resultant. It is an attempt at scientific statistical forecasting which will probably be further developed.

The number of observations of rain is given as a percentage of the total number of observations for each square, but no information is given regarding the amount of rain. No observations of humidity are published, an omission to be regretted in view of the importance of water-vapour both climatologically and in the thermodynamics of the atmosphere.

E. G.

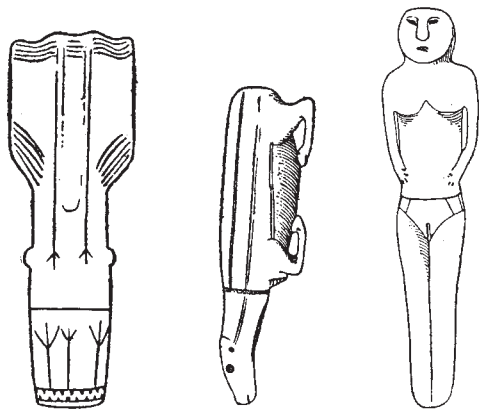
THE EVOLUTION OF DECORATIVE DESIGN.

THREE explanations of the development of decorative design occupy the field at present:—first, that originally suggested by Prof. F. W. Putnam in connection with the ornamentation found on the pottery of the Chiriqui Indians, and independently advocated in this country by Mr. H. Balfour and Dr. A. C. Haddon, that conventional designs are developed from attempts at realistic representations, which gradually degenerate into a purely conventional representation, in which, at its later stages, the realistic origin can hardly be recognised; secondly, that of Semper, which emphasises the influence of material upon the development of the design; thirdly, the theory that the explanations of conventional motives are essentially secondary in character, and are due to the later association of the existing decorative forms with realistic designs. This last, the view propounded by Mr. A. L. Kroeber, Clark Wissler, and Dr. Franz Boaz, has now been re-stated and supplemented by fresh arguments and material by the last of these writers in a paper on the "Decorative Designs of Alaskan Needle-cases," published in vol. xxxiv. of the Proceedings of the United States National Museum.

This group of objects in their most generalised type displays the following features:—a tube slightly bulging in the middle; flanges at the upper end; small knobs under the flanges; a long concave face at the upper end of the tube; long parallel lines with small forks at their lower ends setting off the concave face; border designs consisting of lines at the upper and lower ends of the flanges and on the concave face; and an alternate-spur band at the lower end of the tube. The case itself is formed out of a strip of skin pulled into a tube, which protects the needle against breakage; and its most peculiar feature is a pair of wings or flanges at the upper end, below which are two small knobs on opposite sides of the tube.

This form of ornamentation is believed to be peculiar to Eskimo work, and does not occur in those parts of America or Asia which are beyond the sphere of Eskimo influence. The controversy, as now stated, turns mainly upon the diminutive knobs found in the Eskimo needle-case group, which appear to serve no practical end, and are, it is believed, purely conventional. This type of conventional ornament, according to the view of Dr. Boaz, is found to develop gradually into an animal design, such as that of a crouching beast, the knobs in the assumed later forms becoming heads, such as those of a seal, or even a partially or fully draped human figure, curiously reminiscent of the growth of the aniconic Greek pillar into an anthropomorphic image.

Dr. Boaz argues that it is impossible to believe that in this group the animal form was primitive; in other words, he attempts to prove that the seal-headed and similar more advanced designs could not have been developed by a degradation of a type which was originally more highly specialised. The process, it is contended, was the reverse of this, and the crude knob preceded the animalistic and later developments. "If we were to apply," he urges, "to the present series the theory of the origin of the conventional form from realistic motives, it would be exceedingly difficult to account for the general uniformity of fundamental type. It seems to me that on the basis of this theory we could not account for the diversity of realistic forms and the uniformity of the general type."



Characteristic forms of needle-cases, to show the evolution of type.

Neither does it seem possible to account for the series of types by the assumption of any influence of technic; and my impression is that the only satisfactory explanation lies in the assumption that the multifarious forms are due to the play of imagination with a fixed old conventional form, the origin of which remains entirely obscure. This I freely acknowledge. If, however, we are to form an acceptable theory of the origin of decorative designs, it seems a safer method to form our judgment based on examples the history of which can be traced with a fair degree of certainty, rather than on speculations in regard to the origin of remote forms for the development of which no data are available." Hence he explains decorative forms as "the results of the play of imagination under the restricting influence of a fixed conventional style." This influence of imagination is illustrated in the case of necklaces and leggings made by the American Indians, in which the tendency to use rhythmic repetitions of varying forms is specially apparent. Dr. Boaz sums up the discussion by remarking that "the development of decorative designs cannot be simply interpreted by the assumption of a general tendency towards conventionalism, or by the theory of an evolution of technical motives into realistic motives by a process of reading in; but that a considerable number of other psychic processes must be taken into consideration if we desire to obtain a clear insight into the history of art."

It is impossible to discuss in detail the views of Dr. Boaz in this important contribution. The weak points in

the argument seem to be:—first, that the ultimate origin of the flanges and knobs in this group of objects remains unexplained; secondly, that it seems rash to assume that the historical development of the Eskimo form of design can be definitely established; thirdly, it may be urged that the objects themselves are of too special a type and found in a too limited area to supply a safe basis for such a wide induction as that which is here applied to the evolution of primitive art in general. It seems clearly necessary that a fuller comparison of this group with the types produced by other neighbouring tribes should be a preliminary to any further discussion of their origin and meaning.

It seems not impossible that this Eskimo form of decoration may be due to special influences of environment, technique, and general culture with which we are as yet imperfectly acquainted. This paper, however, with its abundant illustrations and ingenious interpretations of the evolution of decorative forms, must be taken into account by all future writers on the subject. In any case, it illustrates the danger, in the present imperfect state of our knowledge on this and other subjects connected with the thought and culture of so-called "primitive" man, of the dogmatic assumption that any one theory will account for the workings of the artistic faculty when exposed to the varying influences of imagination, culture, and environment.

THE BRITISH ASSOCIATION.

SECTION D.

ZOOLOGY.

OPENING ADDRESS BY SIDNEY F. HARMER, Sc.D., F.R.S.,
PRESIDENT OF THE SECTION.

THE British Association meets this year for the fourth time in Dublin. The last occasion was just thirty years ago, when Sir William Flower presided over Section D, while Prof. Huxley was Chairman of the Department of Anthropology, at that time not raised to the dignity of a separate Section, and Sir Wyville Thomson was President of Section E. The last Dublin meeting was fortunate in having among its officers men who have left an enduring mark on Zoological science.

I can hardly come to the more immediate subject of my Address without referring to the death, on March 9 last, of Henry Clifton Sorby, who had been a member of the Association for nearly fifty years. Dr. Sorby was President of Section C in 1880; but although he does not appear to have presided over Section D, many of his sympathies were with Zoology. He belonged to a type which is becoming almost extinct with the increasing specialisation of science, having done pioneer work in more than one branch. His interest in Chemistry was no doubt responsible for his having taken up the subject of the pigmentation of animals, by his researches on which he is probably best known to Zoologists. During recent years he had devoted particular attention to the study of the marine fauna of East Anglia.

According to the popular estimate, Zoology is regarded as the branch of science that has perhaps the least reference to the details of practical life. The importance of the applications of Chemistry, Physics, Geology, Botany, and Physiology to questions which involve the welfare of the human race is obvious and universally admitted. But pure Zoology is often supposed to be a study of merely academic interest, and its relation to the practical concerns of mankind is not always apparent. It is no doubt true that many of the investigations undertaken by Zoologists are of a highly special nature; and yet when the sum total of the results achieved by workers in this science is estimated it will be found that the contributions of Zoology to the common stock of human knowledge are by no means of restricted application.

There is no conception which has more profoundly influenced thought in all branches of knowledge than the idea of organic evolution, in the development of which Zoology has shared the honours with its sister-subject, Botany. The present summer has seen a memorable event in the celebration by the Linnean Society, on July 1, of the fiftieth anniversary of the communication to that